

CLASSIFIED MESSAGE

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DATE : 1 OCTOBER 1970

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9478

TOP SECRET HANDLE VIA TALENT-KEYHOLE CONTROL SYSTEM

ATTENTION:

REF: TELECON 30 SEPTEMBER 1970

1. FOLLOWING IS A PROCEDURE TO CONVERT YAW VALUES IN A GEOCENTRIC INERTIAL SYSTEM (AS REPORTED IN THE DATA) TO YAW VALUES IN A LOCAL VERTICAL SYSTEM RELATIVE TO THE GROUND TRACK VELOCITY VECTOR AS DISCUSSED IN REF.

2. THE MATHEMATICAL TECHNIQUES FOR THIS TRANSFORMATION CONSIST OF AN ORTHOGONAL ROTATION OF THE GEOCENTRIC INERTIAL SYSTEM INTO THE LOCAL VERTICAL SYSTEM. THE ANGLE OF ROTATION IS COMPUTED AS FOLLOWS:

LET: V EQUAL INERTIAL VELOCITY (FPS)

GAMMA EQUAL FLIGHT PATH ANGLE

AZ EQUAL INERTIAL AZIMUTH

THETA EQUAL NADIR LATITUDE

H EQUAL ALTITUDE (FEET)

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R EQUAL RADIUS OF EARTH (20,855,000 FT.)

OMEGA EQUAL 0.7292115E-05 (EARTHS ROTATION RATE IN  
RADIANS/SEC) (NOTE EXPONENTIAL NOTATION)

THEN: VP EQUALS  $V \cos(\text{GAMMA}) R/CR+H$ VGX EQUALS  $VP \sin(AZ) - R \text{ OMEGA } \cos(\text{THETA})$ VGY EQUALS  $VP \cos(AZ)$ 

FINALLY:

A EQUALS  $\text{ARCTAN}(VGY/VGX) - AZ$  (WHERE THE ARCTAN FUNC-  
TION YIELDS VALUES FROM 0 TO 2 PI)

3. AFTER DETERMINING ANGLE A, THE APPLICATION OF THIS ORTHOGO-  
NAL ROTATION RESULTS IN A CHANGE TO YAW ONLY. PITCH AND ROLL  
ARE NOT AFFECTED. THUS, YAW EQUALS GEOCENTRIC YAW PLUS A.

END OF MESSAGE

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